APPLICATION FOR UNITED STATES PATENT

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Invention: RECLOSEABLE BAG AND METHOD OF PRODUCTION

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RECLOSEABLE BAG AND METHOD OF PRODUCTION

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part of U.S.Patent Application 10/776,671 for "RECLOSABLE BAG AND METHOD OF PRODUCTION"; filed 9 February 2004, which in turn derives priority from U.S. Provisional Patent Application No. 60/444,376, filed: February 10, 2003.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to food bags and, more particularly, to a recloseable self-sealing bag for food articles such as crackers and chips that maintains freshness and yet is easy and inexpensive to manufacture using current production processes.

2. Description of the Background

Plastic bags are used to distribute a wide variety of items. For example, food such as potato and tortilla chips, as well as cookies, crackers and cereal, are frequently sold in disposable plastic bags. Generally, plastic bags are air sealed until opened by the consumer. The air in the sealed bag provides a protective cushion from external forces which can crush the contents of the bag. This is especially true with potato chips and other similar products. Horizontal and vertical Form, Fill and Seal Machines are commonly used in a production environment to form these packages, fill with product and seal, all in a continuous sequence of operations.

It is generally known that the freshness of the products can easily be preserved by reclosing an open bag in an attempt to maintain an airtight seal. Consumers typically fold or twist the open end of the bag and may use a Chip Clip to hold the folded portion in place. Neither method works very well as the folded and/or twisted end inevitably comes undone. More importantly because the Chip Clip is a separate item consumers often find that they don't have one when they need one.

Some food items are packaged with reclosable zippers. For example, potato chips are commercially available (H.E.B7) with a reclosable zipper. The H.E.B. ® chips come in a zippered bag which keeps the chips fresh until the next use. These bags are also made on a Polaris f/f/s machine from Woodman (Decatur, GA), but they require an expensive zipper profile applicator from AMI RecPro (Glenview, IL). AMI RecPro also provides the TopZip Proseal™ reclosable zipper.

U.S. Pat. Nos. 4,812,074 and 4,601,694 disclose such zippers fully integrated into the bag and is a part of the bag's primary sealing mechanism.

Another method and device is suggested in U.S. Pat. No. 4,909,017, et al., which discloses a method of making a form fill bag having a reclosable fastener thereon. During the manufacturing process reclosable fasteners are attached to the bag in a direction perpendicular to the flow of the web material. Similarly, U.S. Patent No. 4,810,103 to Bell issued March 7, 1989, shows a resealable bag closure arrangement including an elongated flexible wire (21) arranged in a serpentine configuration and operatively attached to the flexible walls (14) of the bag member (13) to form a resealable closure.

The aforementioned methods and devices suffer from a number of drawbacks, most

notably, that the existing manufacturing plants that utilize a conventional form, fill, and seal machine would need to purchase new equipment or retool their own equipment to add the capability of attaching a resealable closure. The degree of retooling to accomplish this could be considerable. It would be far more advantageous to provide a more economical way of attaching a resealable fastener as a part of the conventional form, fill, and seal process in a way that requires a minimum of retooling.

SUMMARY OF THE INVENTION

It is, therefore, the primary object of the present invention to provide an improved recloseable self-sealing bag for food articles such as crackers and chips that maintains freshness and yet which is easy and inexpensive to manufacture using current production processes and equipment.

It is another object to provide a more economical way of attaching a resealable fastener as a part of the conventional form, fill, and seal process in a way that requires a minimum of retooling.

These and other objects are accomplished by a recloseable bag having a front face and a rear face. One or more bendable shape-retaining flat members are stamped and bonded to either the front or rear face of the bag in various forms or configurations with a reprogramming of the servo motors.

In one embodiment, the flat members are T-shaped spines formed of a bendable plastic shape-retaining polymer material.

In a second embodiment, the flat members are formed of resilient plastic or other compatible material having one or multiple shape-retaining strand materials (i.e. flat or round wire strand(s)) embedded therein.

In a third embodiment, one or more elongate members are secured to one of the enclosure's faces, either inside or outside, approximately parallel to one of the enclosure's seams. These elongate members posses shape retaining properties such that they remain in the shape last applied.

In a fourth embodiment, the shape retaining material is encapsulated in a protective coating that can be run in various locations, shapes or configurations by simply reprogramming the application servo motors.

An installation machine is also disclosed for simultaneous formation of and heat- or adhesive-application of the flat members to the recloseable self-sealing bag material either prior to or during the filling and sealing process.

The present invention's design is simple and straightforward, highly effective, can be economically manufactured, and there is no wasted material in the production process.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features, and advantages of the present invention will become more apparent from the following detailed description of the preferred embodiments and certain modifications thereof when taken together with the accompanying drawings in which:

FIG. 1 is a rear perspective view of the recloseable self-sealing bag 2 for food articles

according to one embodiment of the present invention, having two elongate spines 14 that are formed of a bendable plastic polymer material.

FIG. 2 is a rear perspective view of an alternative embodiment of a recloseable self-sealing bag 4 for food articles according to the present invention, having two elongate spines 24 which are formed of resilient plastic having a shape-retaining wire strand embedded centrally therein. The wire strand can stop short of the ends of the encapsulating protective coating or be cut off even with the encapsulation material.

FIG. 3 is a rear perspective view of an alternative embodiment of a recloseable self-sealing bag 6 for food articles with two flat T-shaped spines 34 stamped and bonded on the rear surface. The wire strand can stop short of the ends of the encapsulating protective coating or be cut off even with the encapsulation material.

FIG. 4 is a rear perspective view of an alternate embodiment of a recloseable, self-sealing bag 8 for food articles according to the present invention, having two curved elongate members 44 that are formed of resilient plastic having a shape-retaining wire strand embedded centrally within. The wire strand can stop short of the ends of the encapsulating protective coating or be cut off even with the encapsulation material. It should be noted that elongate members 44 may be formed of a bendable shape-retaining material rather than resilient plastic having an integral shape-retaining wire strand. Any bendable vinyl, bendable shape-memory-polymer (SMP), or other shape-retaining material will suffice.

FIG. 5 is a side perspective view of an installation machine 100 for installation of an of the elongate spines 14-44 described above during the filling and sealing process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 is a rear perspective view of the recloseable self-sealing bag 2 for food articles according to one embodiment of the present invention. The recloseable self-sealing bag 2 is folded and formed with a top heat seam 12, bottom heat seam 16 and a center rear heat seam 20, as are conventional bags. It is produced from film stock by horizontal or vertical form, fill and seal machines in a conventional manner. Specifically, rolls of bag material are activated by a power unwind and advance down over a bagger's forming collar. They are code-dated by an ink-jet encoder-printer, and can be spot-labeled by a pressure-sensitive label applicator, depending on customer requests. Conventional form, fill and seal machines are typically equipped with a vertical sealing bar and horizontal sealing bar. The bags are pulled over the forming collar by sealing jaws, and the vertical sealing bar and horizontal sealing bar are applied to create the bottom and center rear seams 16 and 20, respectively, leaving an open-topped bag that is ready to be filled. Normally, after filling, a top heat seam 12 is applied. Similar processes are used for pouch and stand-up bags, and one skilled in the art will readily understand that the recloseable self-sealing concept described herein can easily be employed with these or any other form, fill and seal bag constructed with flexible bag material.

In accordance with a preferred embodiment of the present invention, opposing spines 14 are stamped and bonded to the bag on the rear surface in locations that do not interfere with the otherwise conventional seaming process (i.e. each of the two spines 14 are

positioned a short distance beneath the top heat seam 12 and on either side of center rear seam 20). In the illustrated embodiment, each spine 14 comprises a downwardly protruding strip running lengthwise down the bag. Both spines 14 are preferably formed of a bendable shape-retaining material, such as a bendable vinyl, bendable shape-memory-polymer (SMP), or other shape-retaining material. The spines 14 are run off side-by-side spools onto the bag material as it passes through the bagger, either before, during or immediately after the seal bar creation of the bottom and center rear seams 16 and 20, respectively, before imparting the top heat seam 12 to the bag. The spools are articulating, PLC controlled (under common control with the bagger), and the spools are equipped with cutters to cut the proper length. The cut spines 14 are then bonded to the surface of the bag using conventional heat sealing technology, pressure sensitive glue, or adhesive. Given the elongate configuration of the spines 14 and their bendable shape-retaining material, the spines 14 reliably hold the bag closed (upon rolling or folding the top of the upper horizontal section 10 of the bag down) or open (upon straightening the downward central section 18), as desired. The spines 14 can be produced in many colors as desired.

FIG. 2 is a rear perspective view of an alternative embodiment of a recloseable self-sealing bag 4 for food articles according to the present invention. As before, the recloseable self-sealing bag 4 of this embodiment is folded and formed with a top heat seam 12, a bottom heat seam 16, and a center rear heat seam 20. Two flat elongate spines 24 are stamped and bonded on the rear surface in locations that do not interfere with the otherwise conventional seaming process (i.e. each of the two spines 24 positioned a short distance beneath the top heat seam 12 and on either side of center rear seam 28).

Each spine 24 is formed as a downwardly protruding strip. In this embodiment the spines 24 are preferably pre-formed of a resilient plastic with a shape-retaining strand material 29 embedded centrally therein. The shape-retaining strand material 29 can be wire, wire mesh, or a variety of other shape-retaining materials, and it is fully embedded or encapsulated in the plastic. The spines 24 are bonded to the surface using conventional heat sealing technology or adhesive. Again, this embodiment is preferably installed during production before, during or immediately after the seal bar creation of the bottom and center rear seams 16 and 20, respectively, before imparting the top heat seam 12 to the bag. As with the previous embodiment, the elongate configuration of the spines 24 and their bendable shape-retaining material 29, the spines 24 reliably hold the bag 20 closed (upon rolling or folding the top of the upper horizontal section 30 of the bag down) or open (upon straightening the downward central section 28), as desired. The spines 24 can be produced in many colors as desired.

FIG. 3 is a rear perspective view of an alternative embodiment of a recloseable self-sealing bag 6 for food articles according to the present invention. As before, the recloseable self-sealing bag 6 of this embodiment is folded and formed with a top heat seam 12, a bottom heat seam 16, and a center rear heat seam 20. Two flat T-shaped spines 34 are stamped and bonded on the rear surface in locations that do not interfere with the otherwise conventional seaming process (i.e. each of the two spines 34 positioned a short distance beneath the top heat seam 12 and on either side of center rear seam 20).

Each T-shaped spine 34 includes an upper horizontal section 30 bisected by a downwardly protruding central section 28. In this embodiment the spines 34 are preferably

pre-formed of a resilient plastic with a shape-retaining strand material 29 embedded centrally therein. The shape-retaining strand material 29 can be wire, wire mesh, or a variety of other shape-retaining materials. The T-shaped spines 44 are bonded to the surface using conventional heat sealing technology or pressure sensitive adhesive. Again, this embodiment is preferably installed during production before imparting the rear heat seam 28 to the bag. As with the previous embodiment, the T-shaped configuration of the spines 44 and their bendable shape-retaining material 29, the T-shaped spines 44 reliably hold the bag 20 closed (upon rolling or folding the top of the upper horizontal section 30 of the bag down) or open (upon straightening the downward central section 28), as desired. The horizontal component of the spines 44 allows the edges of the bag 20 to be furled inward. The T-shaped spines 44 can be produced in many colors as desired, and again it should be noted that elongate members 44 may be formed of a bendable shape-retaining material rather than resilient plastic having an integral shape-retaining wire strand. Any bendable vinyl, bendable shape-memory-polymer (SMP), or other shape-retaining material will suffice.

Fig 4. is a rear perspective view of another alternative embodiment of a recloseable self-sealing bag 8 for food articles according to the present invention. As before, the recloseable self-sealing bag ~~20~~ 8 of this embodiment is folded and formed with a top heat seam 12, a bottom heat seam 16, and a center rear heat seam 28. Each elongate curved spine 44 is formed to include an upper horizontal section 40 intersecting a downwardly protruding central section 37. In this embodiment the illustrated spines 44 are formed of a resilient plastic with a shape-retaining strand material 29 (wire, wire mesh, or a variety of other shape-retaining materials) embedded centrally therein, although they may alternatively be

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formed of a bendable shape-retaining polymer as discussed above to eliminate strand material 29. The two curved flat members 44 are formed (stamped) and bonded on the rear surface in locations that do not interfere with the otherwise conventional seaming process (i.e. each of the two spines 44 positioned a short distance beneath the top heat seam 12 and on either side of center rear seam 20). The curved spines 44 are run off side-by-side spools onto the bag material as it passes through the bagger, either before, during or immediately after the seal bar creation of the bottom and center rear seams 16 and 20, respectively, before imparting the top heat seam 12 to the bag. The spools in this case are fully articulating, PLC controlled (under common control with the bagger), are equipped with end-cutters to cut the proper length, and are defined by die cutters to score the plastic material with notches or crimps 47 alongside of the strand material 29 to facilitate the curvature. The cut spines 44 are then bonded to the surface of the bag using conventional heat sealing technology or adhesive. In this case the spools must be dual-axis controllable: 1) pivoting for directional laying of the spines 44 on the bag material, and 2) laterally-positionable. Thus, the spines 44 are laid onto the bag 20 by initially orienting the spools lengthwise along the bag, and then by pivoting the insert spools to effect the curve 44. The spools are formed with lateral die-cutting teeth that are calibrated to impart scoring 47 alongside of the strand material 29 at the transition between the horizontal and vertical components of spines 44. This may be programmed into the PLC (under common PLC control with the bagger), and at the proper time the spines 44 are end-cut to cut the proper length. Again, the foregoing process may readily be adapted for pouch, stand-up bags, and other bags formed of flexible material, and one skilled in the art will readily understand that the method of forming a recloseable self-

sealing bag as described herein can readily be employed with these or any other form, fill and seal bags.

As with the previous embodiment, the horizontal 40 and vertical 37 sections plus their bendable shape-retaining material 29, reliably hold the bag 20 closed (upon rolling or folding the top of the upper horizontal section 40 of the bag down) or open (upon straightening the downward central section 37), as desired. It should be apparent that with spools that are fully articulating, the spines 44 can be produced in a variety of shapes and curves as desired during their application to the bag material.

While the three preferred embodiments of the present invention that are described herein employ two spines on the rear surface of the bag, depending on the size of the bag the number of spines may vary. For example, single serving bags may require only one spine and large bags may require two or more spines. Also, it should be noted that while the embodiments described herein position the spines on the rear surface of the bag for aesthetic purposes, the spine(s) may be positioned on the front surface of the bag or one of inside surfaces.

FIG. 5 is a side schematic view of an installation machine 100 for installation of the flat elongate spines 14, 24, 34 and 44 to the recloseable self-sealing bag 2 either prior to filling and sealing or during the filling and sealing process. The installation machine 100 can be used as a standalone assembly (prior to filling and sealing), or retrofit to an existing horizontal or vertical form, fill and seal (FFS) machine as commonly used in a production environment (for example, the Orpack GL-250 Form-Fill-Seal).

If retrofitting the installation machine 100 to an existing FFS machine, the installation machine 100 is added into the circuit prior to the bag heat formation (seam sealing) step.

The installation machine 100 includes a feeder spool 108 for feeding a unitary strip of bag material 126 into a hydraulic, electrical press or servo motor press 106 with integral glue applicator and cutter arrangement. The bag material 126 is pulled there through by programmable servo-driven roller 120 and free wheeling tension roller 119. The programmable servo-driven roller 120 is electrically connected to the existing programmable controller of the FFS machine (not shown) for programmed operation thereof.

The installation machine 100 also includes articulated feeder spool 107 for feeding a unitary strip 125 of the bendable plastic shape-retaining polymer material to lay and cut the spines 14-44 of FIGs. 1-4, thereby feeding the spines into the hydraulic press 106 in tandem with the bag material 126. The press rollers 114 may be equipped with an integral glue applicator, if desired, for adhesive bonding of the spines 14-44 thereto. The press 106 is electrically connected to the existing programmable controller of the FFS machine for programmed intermittent operation thereof. Again, the articulated feeder spools 107 is steerable, laterally- and vertically-positionable with programmable servo feeder wheel 109 and free wheel 110 feeding insert material to a cutting and splice die 111 which is controlled by programmable servo motor 112. The insert material is further controlled by programmable servo feeder wheel 113 and free wheel 124. The wheels may be notched with die-cutting teeth to impart scoring alongside the spines 14-44 to make them bend more easily. Specifically, the free wheel 124 is readily formed as needed to accomplish all die

cutting, notching and scoring. In this case a vacuum suction device is preferably disposed there beneath to dispose of cuttings. Programmable servo feeder wheel 113 and free wheel 124 feed insert material 125 into insert guide 118 attached to press wheels 114. Insert guide 118 has an integral hot-air blower disposed toward the insert material 125 for concentrating hot air upon insert material as it enters the press wheels 114 to effect an appropriate temperature to heat-weld the spines 14-44 to the respective faces of the bag material 126, which then apply pressure to bond the heated shape retaining material to the bag face all in one step. Press 106 is controlled laterally by programmable servo motor 115 driving slide bar 116 with teeth or a rack. The press is also rotationally controlled by programmable servo motor 117 attached thereto by a gear mechanism or the like. This combination slide and rotation action allows for the insert to be easily installed onto bag material in many different shapes with a simple reprogramming of the servos. Bag material with attached shape retaining members is further controlled by free wheeling tension roller 121 in tension roller guide 123 and free wheeling roller 122. With the spines 14-44 adhesively or pressure-bonded to the bag material 126, the bag material with shape-retaining spines 14-44 may either be collected on another collection spool (not shown) for later use, or may be fed directly to the next process step in the existing FFS machine. Depending on the position of the collector spool, the present inventor has found it helpful to incorporate one or more needle roller bearings along the collection track to ease pickup. There are a variety of conventional needle roller bearings available from, e.g., Timken® that can be mounted lateral to the path of the bag material with shape-retaining spines 14-44 to facilitate angling of the collection path (for example, to divert it upward to the collection spool) for the purpose of high-speed operation

without breakage. For example, a needle bearing in advance of the collector and/or at the forming collar (where food is inserted and the bag is closed) works to prevent tearing of material. In addition, if necessary, an optional blower (not shown) or other cooling device may be mounted on tension roller guide 123 to cool the spines 14-44 and bag material 126 after heating by the integral hot-air blower of insert guide 118.

FIG. 6 is a front perspective view of the hydraulic press 106 of FIG. 5 shown with spines 14-44 being fed in tandem with the bag material 126. The press 106 is electrically connected to the existing programmable controller of the FFS machine for programmed intermittent operation thereof. The press 106 includes an upper programmable servo feeder wheel 109 that is steerable, laterally- and vertically-positionable, and free wheel 110 which affix the spines 14-44 to the respective faces of the bag material 126 by pressure. As can be seen, press 106 is controlled laterally along slide bar 116, and is also vertically and rotationally controlled by programmable servo motor (see FIG. 5) attached thereto by a gear mechanism or the like. The combination of slide and rotation action allows for the insert to be easily installed onto bag material in many different shapes with a simple reprogramming of the servos.

FIG. 7 is a side perspective view of free wheeling tension roller assembly 121 of FIG. 5 including free wheeling roller 122 mounted with a vertical degree of freedom in tension roller guide 123 to maintain tension on the bag material 126. The tension roller assembly 121 may be a conventional spring biased and/or pneumatic cylinder for maintaining controlled upward pressure against roller 122, and hence on the bag material as it passes over. Conventional speed sensors 129 may also be mounted on the tension roller assembly

121 and connected to the PLC to maintain an acceptable roller speed and/or for automatic safety shutdown.

FIG. 8 is a front perspective view of the free wheeling tension roller assembly 121 of FIG. 7 including free wheeling roller 122 mounted with a vertical degree of freedom in tension roller guide 123, with spring biased and/or pneumatic cylinder for maintaining controlled upward pressure against roller 122 and the bag material as it passes over.

Having now fully set forth the preferred embodiment and certain modifications of the concept underlying the present invention, various other embodiments as well as certain variations and modifications of the embodiments herein shown and described will obviously occur to those skilled in the art upon becoming familiar with said underlying concept. It is to be understood, therefore, that the invention may be practiced otherwise than as specifically set forth in the appended claims.